ElectroChemical Arsenic Remediation

ECAR

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Berkeley
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Outline

- Arsenic problem in the U.S.
- ECAR- a novel solution
- Demonstration project in India
- Future of ECAR
- Q&A

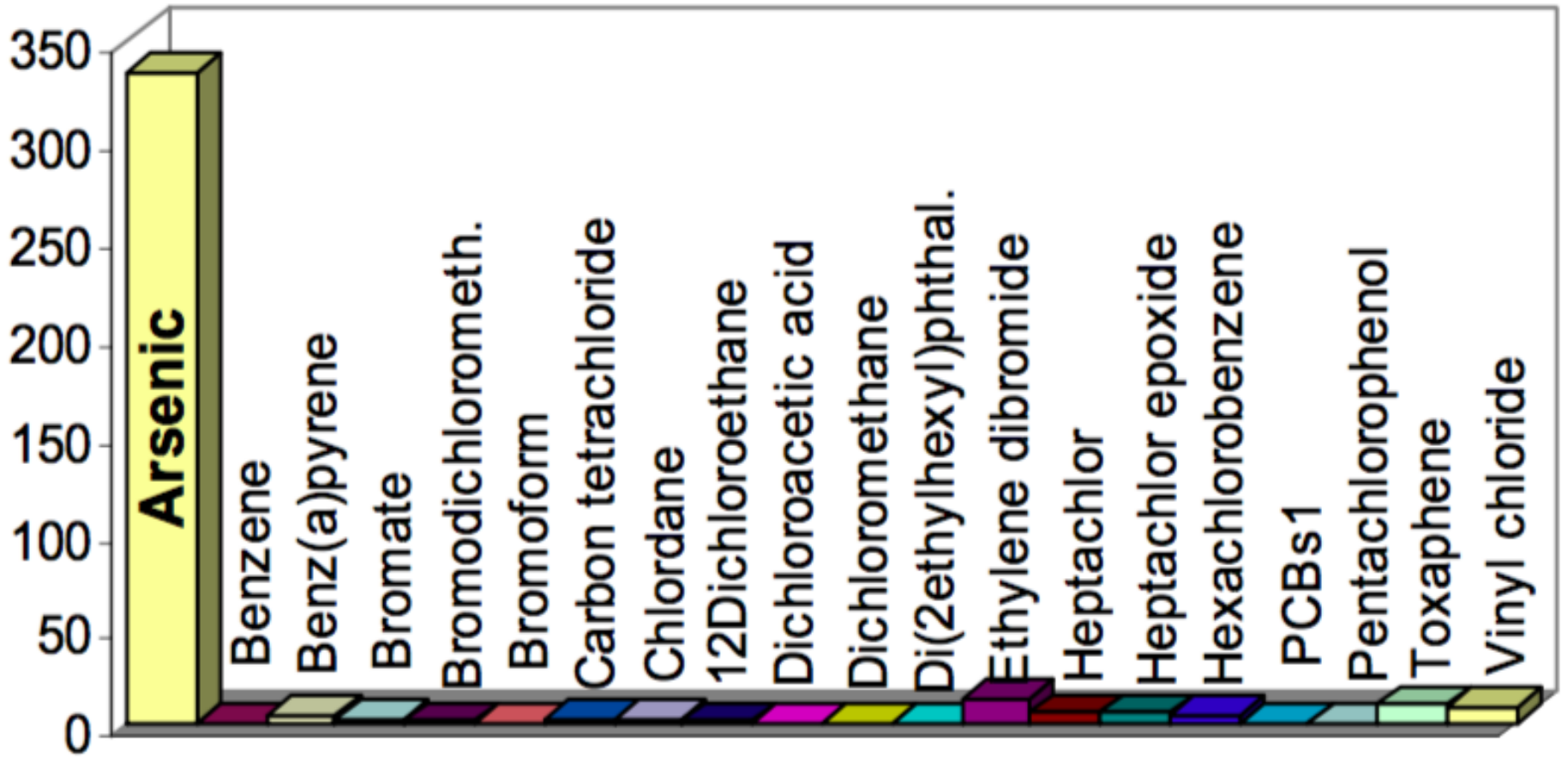
The Arsenic problem in the United States

Private wells: An estimated **2.1 million people are exposed to Arsenic** at levels above the EPA Maximum Contaminant Limit of 10 part per billion (ppb). Source: USGS 2017

Public water systems: As of 2014, **538 public water systems had an arsenic MCL violation**. *Assuming these systems serve a maximum of 10,000 people this means at most 53.8 million people exposed*. Source: EPA 2015

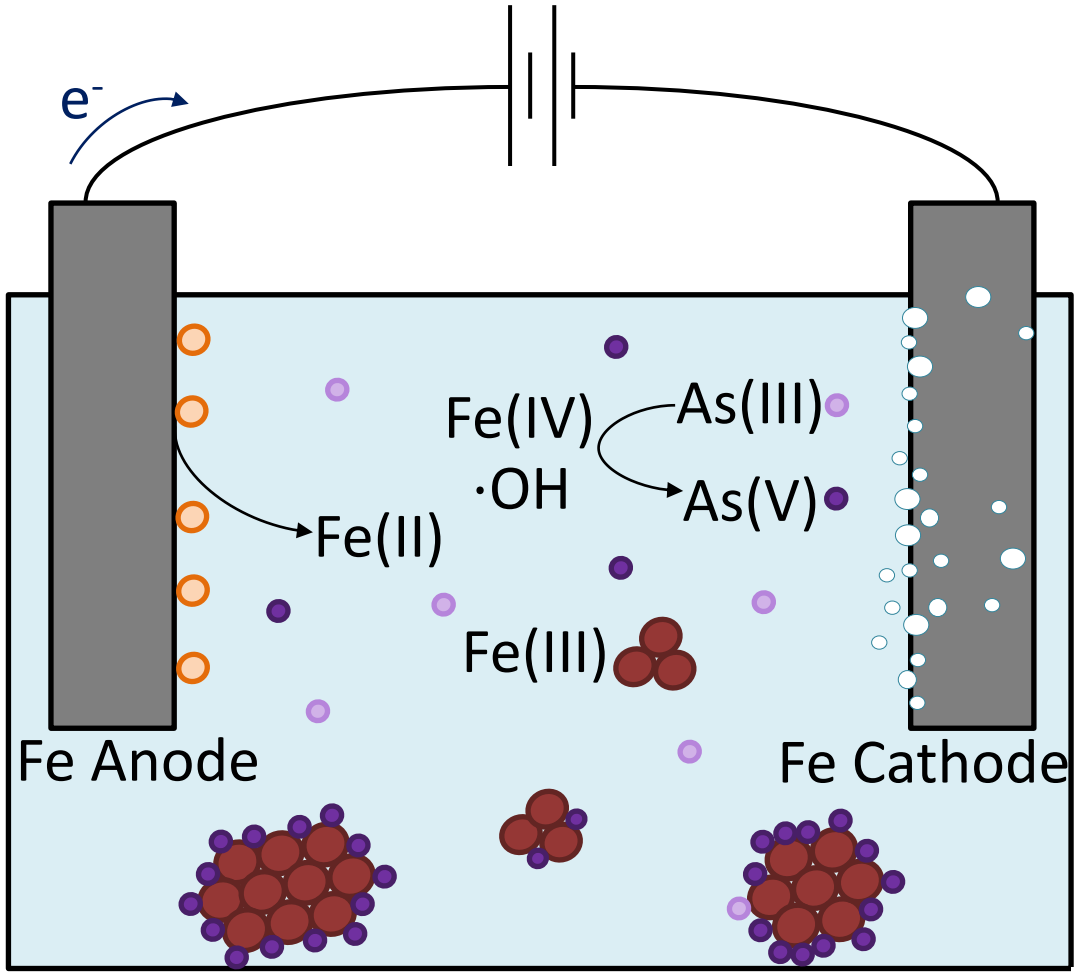
Importance of regulation: Columbia University School of Public Health finds that compliance with EPA regulation has led to a decline of 17% in levels of urinary arsenic. Source: The Lancet Public Health

Arsenic presents the highest lifetime cancer risk of any regulated carcinogenic water contaminant



Source: Smith, Steinmaus 2002

ECAR the solution- how it works

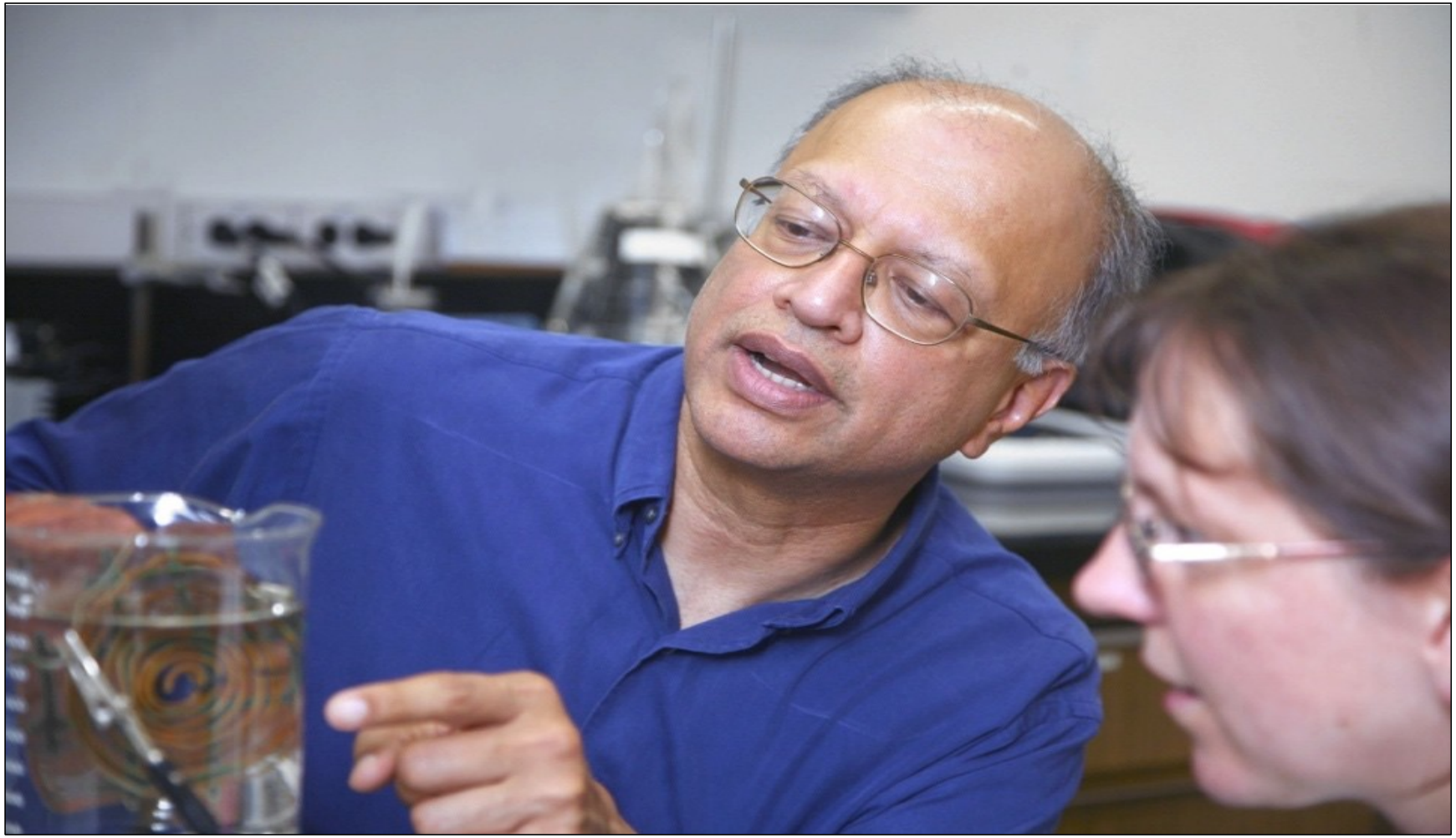


- Dissolved Fe(II)
- Aqueous As(III)
- Aqueous As(V)
- Fe(III)(oxyhydr)oxides

Slide Credit: Dana Hernandez

Prototype Progression: 2006

(Bench-top Research in a 1-L beaker)



Berkeley, 2006

Prototype Progression: 2010

(Small-scale 100-L reactor)

West Bengal, 2010

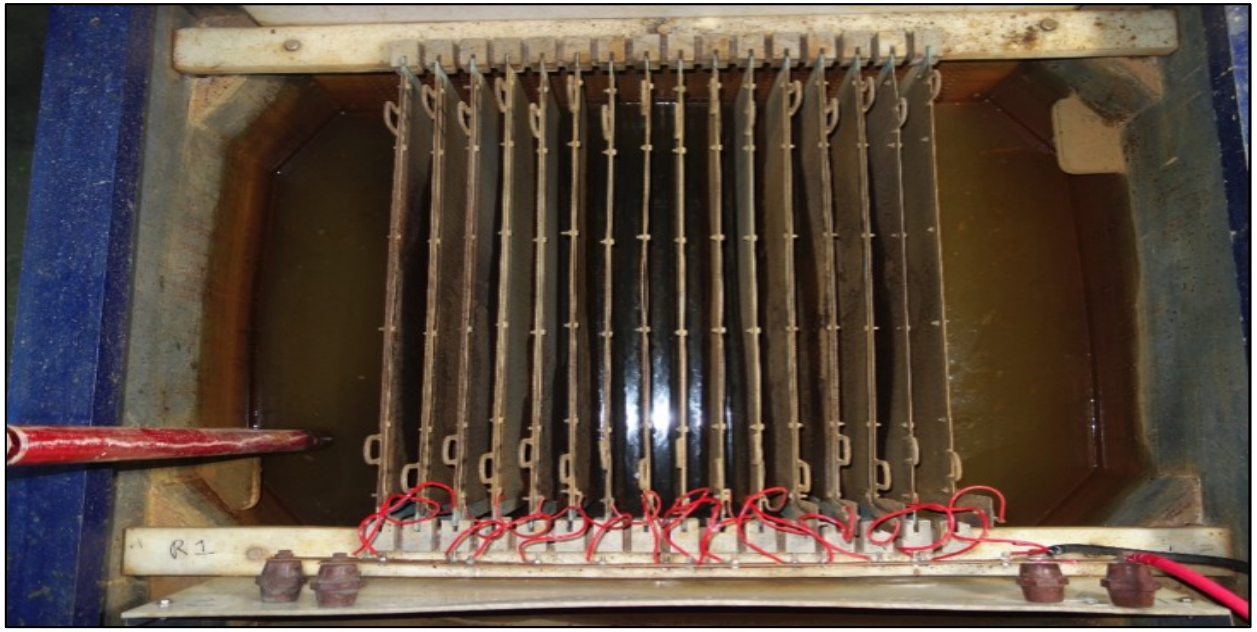
Prototype Progression: 2013

(Practical-scale 600-L reactor)

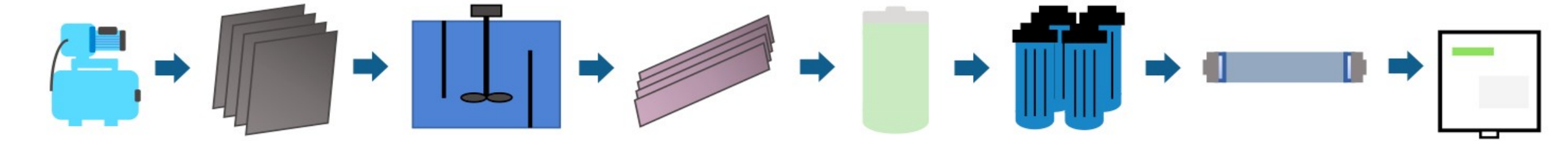
Jadavpur University, West Bengal, 2013

Prototype Progression: 2016

(Large-scale 2,000-L reactor)



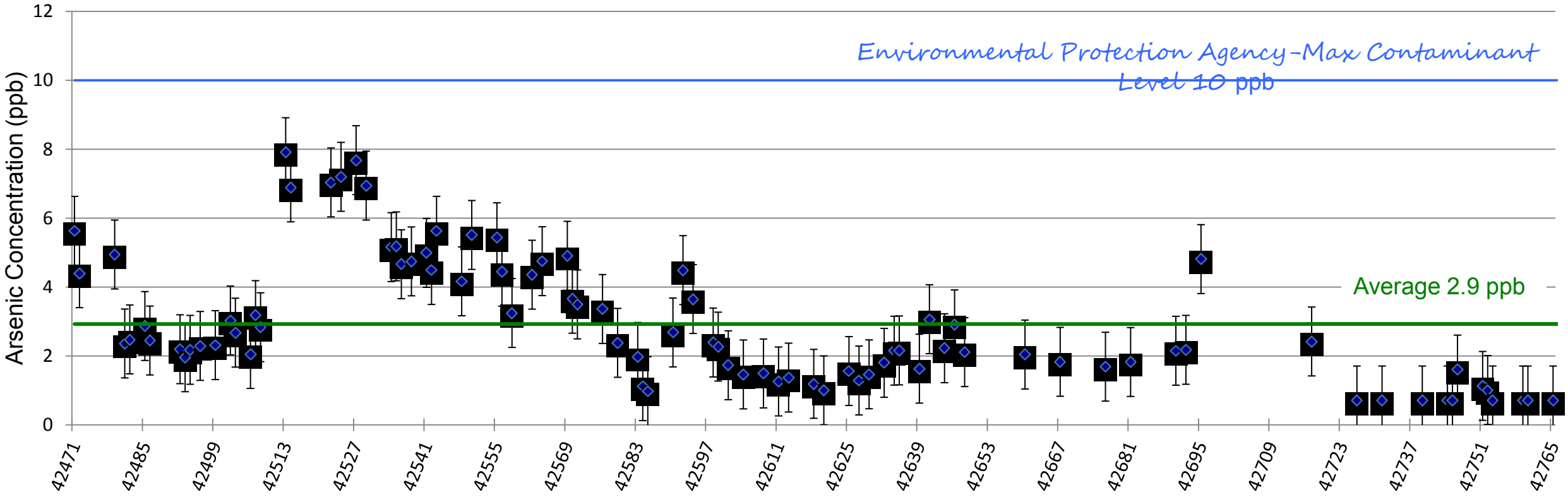
Current pilot plant operating in West Bengal, India



Slide Credit: Dana Hernandez

Results from pilot plant from April 2016 to Jan 2017

Initial Arsenic Concentration **252 ± 29 parts per billion (ppb)**



Future of ECAR

1. Next Generation
   - Increase output (sufficient for small water systems in the U.S.)
   - Shrink footprint

2. Demonstration plant in Allensworth, California
   - Prove that ECAR is robust with different groundwater matrices and that it can be a cost competitive technology in the U.S. water market

Current team members- UC Berkeley

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R&D Engineer
Kate Boden

Thanks!

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